

- Fig. 54.* Cephalothorax and abdomen, from above and behind, with the former elevated.
Fig. 55. The same, with cephalothorax depressed forwards, as in fig. 53, *i. e.* in natural position of rest.
Fig. 56. Spider of natural size.

PLATE VI.

Salticus bicurvatus.

- Fig. 57.* Spider magnified.
Fig. 58. The same, in profile, without legs.
Fig. 59. Right falx, showing double row of minute teeth underneath.
Fig. 59 a. Left falx.
Fig. 60. Natural length of spider.

Salticus platyleoides.

- Fig. 61.* Spider without legs.
Fig. 62. Portion of ditto, in profile.
Fig. 63. Spider, of natural size.
Fig. 64. Underside, showing maxillæ, labium, sternum, and left palpus.
Fig. 65. Right falx, from inner and underside.
Fig. 65 a. Natural length of spider.

Eresus bicolor.

- Fig. 66.* Spider, from above, with only portion of leg of first pair.
Fig. 67. The same, in profile, without legs.
Fig. 68. Cephalothorax (caput) and falces, from front.
Fig. 69. Natural length of spider.

Eresus tibialis.

- Fig. 70.* Leg of first pair, showing enlarged tibial joint (*a*).
Fig. 71. Natural length of spider.

XIV.—*Note on a Fossil Lycopodiacean Fruit.*

By M. BRONGNIART*.

THE study of the fossil plants of the older strata possesses a peculiar interest in consequence of the singularity of their forms, which most frequently separates them in a very striking manner from those which live at present on the earth. With the exception of the ferns, the resemblance of which has always been recognized, the plants of the Carboniferous formation differ so much from those which have inhabited the earth at more recent periods, and from those which now inhabit it, that very careful comparisons have been required to connect them with the families of the existing world. Nevertheless, from the commencement of my investigations upon this subject, I have indicated the relations of several arborescent plants of this period to the Horsetails or Equisetaceæ and to the Lycopodiaceæ.

* Translated by W. S. Dallas, F.L.S., from the 'Comptes Rendus,' Aug. 17, 1868, tome lxxvii. pp. 421-426.

As regards the latter, I had referred to the large stems and branches which constitute the genus *Lepidodendron*, certain spikes or cones of fructification which appeared to me to be cones of those gigantic Lycopodiaceæ, and had given to them the name of *Lepidostrobus*. Subsequently these relationships were completely confirmed by the researches of Dr. Joseph Hooker upon several specimens of *Lepidostrobus** contained in the nodules of carbonate of iron from the English coal-measures, the internal structure of which had been sufficiently well preserved to allow the form of the sporangia borne by the scales of these cones, and the nature of the spores which they contained, to be much better appreciated than I had been able to do.

Another remarkably well-preserved specimen, the origin of which, however, was unknown, had been previously described by our illustrious associate, Robert Brown, under the name of *Triplosporites*. The profound investigation which he made of this specimen in 1847, and the additions which he made on publishing his memoir in 1851 †, after the examination of a fine specimen which I showed him in 1849, left no doubt in his mind as to its intimate relations with *Lepidostrobus*, from which he hesitated to regard it as generically distinct.

But the specimen described by Robert Brown ‡, as well as that of the Museum of Strasbourg (one-half of which has been given to the Museum at Paris, and was communicated to him by me), only presents small portions of these cones; that described by R. Brown evidently corresponds to the apex of one of the cones: that which I had examined appeared to come from the base; but the perfect specimen which forms the subject of this notice proves that it belongs rather to the middle part of one of these spikes of fructification. In fact the lower part of cones of this kind presents very remarkable differences of organization, which must materially modify the characters ascribed to these fossils, and seem to indicate that there are between them and *Lepidostrobus* greater differences than had been supposed, at least if the organization of these latter fruits could be sufficiently appreciated in the specimens described by Dr. Joseph Hooker.

The numerous but often very imperfectly preserved specimens studied by that excellent observer are most frequently

* Memoirs of the Geol. Survey of Great Britain, vol. ii. p. 440.

† "Some Account of *Triplosporites*, an undescribed Fossil Fruit," Trans. Linn. Soc. vol. xx. p. 3. (Read to the Society June 15, 1847.)

‡ This specimen was derived from the collection of Baron Roger; and a transverse section, preserved in the collection of the Marquis de Dré, is at present a portion of the collection of the museum.

only very limited portions of these spikes; some, however, appear to have been preserved throughout their whole extent, and there is nothing to indicate any difference of structure between the base and the apex. Throughout, the scales bear sporangia of the same form, and apparently enclosing bodies of the same nature; this at least is indicated by the figures and descriptions published by the learned English botanist.

These characters, therefore, seem to approximate the *Lepidostrophi* to the true *Lycopodia*, of which all the sporangia are similar and contain identical spores.

The family Lycopodiaceæ includes two other genera, which are very different in this respect, *Selaginella* and *Isoëtes*, which, on the same stalk or in the same spike, in one word, on the same axis, present sporangia of two kinds, some containing very small spores destined to produce antheridia and to perform the function of fecundating organs, and the others larger spores, which will germinate after being fecundated. These two kinds of organs, which cooperate in reproduction, have been designated by the names of *microspores* and *macrospores*.

Nothing in the specimens described either by R. Brown or by Dr. J. Hooker would indicate this double nature of the sporangia or of the spores; but a very complete and generally well-preserved specimen of a spike identical in its upper part with the *Triplosporites* of R. Brown has just thrown a new light upon this subject, and shown in these fossils modifications analogous to those which we observe in the living Lycopodiaceæ.

This remarkable specimen was found in a drift deposit at the entrance of the valley of Volpe, in the Haute-Garonne, by M. Dabadie; it was communicated to me by M. Lartet, to whom it had been confided by M. Dabadie; and the author of this interesting discovery has been kind enough to allow me to have it sawn through its long diameter, and to retain one-half for the museum. This specimen, which was carefully modelled before being cut through, is entirely silicified: the organization of the various parts is well preserved in many points; nevertheless its anfractuosités and crystallized portions do not allow it to be examined equally well in all parts.

It presents the form of a cylindrical cone or strobile, 0·12 metre in length and 0·055 metre in breadth, showing on the outside the apices of the scales of which it is composed; these form twenty-seven perfectly regular longitudinal rows, and are arranged in accordance with a very much flattened helix, the generative spiral of which would be expressed by

the fraction $\frac{2}{27}$, an arrangement which approaches that observed in the leaves of many living Lycopodiaceæ*.

The scales or bracts which form this spike spring perpendicularly from the axis, and are even a little reflexed; they have exactly the organization so well described by R. Brown in his *Triplosporites*, and to which it seems to me useless to revert; as in his specimen they are bent up towards the extremity and terminated at the surface of the fossil by an hexagonal disk, which would, as in *Lepidostrobus*, be produced into a foliaceous appendage, which has been destroyed.

Upon the narrow pedicels of these scales are inserted oblong sporangia, rounded at the extremity as in *Triplosporites*; those which occupy the apex and middle part of the spike are filled with an innumerable multitude of little spores, formed by three or sometimes four united spherical cells, apparently separating in some cases into simple globular spores.

In the lower third of the same spike we observe sporangia similar in form and mode of insertion to the preceding, but distinguished at once by their large, simple, spherical spores, the diameter of which is ten or twelve times that of the cells of which the little spores are composed. They are very distinct to the naked eye, their diameter being 0·6 millim., and enable the sporangia to be at once distinguished from those containing the microspores.

These large and perfectly spherical spores have a thick smooth wall; they most frequently contain scattered globular granules, the nature of which is difficult to determine, but which appear to be connected with a state of immaturity; some, filled with an opaque matter, seem to be more advanced in their development.

This spike, therefore, like those of the Lycopodiaceæ of the genera *Isoëtes* and *Selaginella*, presents sporangia of two kinds:—those near the summit of the spike containing microspores, that is to say, antheridia; the others, situated towards the base of the spike, containing macrospores or germinative spores.

The form and mode of insertion of the sporangia, their great size, the considerable number of macrospores which they contain, and the absence of any trace of a regular line of dehiscence cause these organs especially to resemble those of *Isoëtes*; but in the latter these sporangia are inserted upon the very base of the leaves, which spring from a very short and bulbiform stem. In the fossil plant, on the contrary, these sporangia are borne by a kind of bracts or squamiform leaves united into a

* I have indicated this mode of arrangement of the leaves of Lycopodiaceæ in the 'Histoire des Végétaux fossiles,' tome ii. p. 11.

spike, which, probably, like those of *Selaginella*, terminated the branches. Here, therefore, we have a peculiar combination of characters, namely, sporangia analogous to those of *Isoëtes* united into a spike similar to that of the Lycopodiaceæ, but much larger.

The great size of these organs is, in fact, one of the striking characters of these spikes; it is in proportion to the arborescent stature of the *Lepidodendra*, compared with that of the living Lycopodiaceæ, but it is none the less remarkable, for most commonly the organs of reproduction do not follow the growth of the vegetative organs: the largest tree ferns have sporangia no larger than the smallest species, just as the flowers of our largest trees are often even smaller than those of the humblest herbaceous plant. In these plants of the primitive world growth was simultaneous in both systems of organs.

Thus the *Lepidodendrea*, or arborescent Lycopodiaceæ, had spikes of fructification comparable in size to the cones of firs and cedars, and containing very voluminous sporangia, even larger than those of *Isoëtes*, which they approach in form and structure.

A final question remains to be solved. Have the true *Lepidodendra*, the fruits of which, or *Lepidostrobi*, were investigated by Dr. J. Hooker, only a single kind of spores? or did the imperfect state of his specimens prevent the recognition of the nature of the spores contained in the sporangia of the lower part of the spikes of fructification? The form of the spores of these *Lepidostrobi*, which is quite different from that of the microspores of *Triplosporites*, would lead me to think that these plants are not congeneric, and that the genus *Triplosporites* of Robert Brown should be maintained. †

The three known specimens of this plant do not establish its real geological position; the origin of that described by R. Brown, and of that of the Strasbourg Museum, is entirely unknown; the one that I have just described was found in the transported material of a valley in the Pyrenees, far from the beds in which it must have been originally deposited; nevertheless we cannot doubt, from the nature of the plants which it most nearly approaches, that it belongs to some bed contemporaneous with the Carboniferous or Old Red Sandstone formation.

Robert Brown in his memoir has given no specific name to the plant which he described; but the confirmation of its generic value, and the probability that we shall find other forms of the same genus, induce me to consecrate the memory of his excellent observations by designating this species by the name of *Triplosporites Brownii*.

I must remark in conclusion that the very perfect specimen that I have just described probably represents a spike of fructification which had not reached its last degree of development. Two facts seem to indicate this: 1, the microspores, in nearly all the sporangia which contain them, are immersed in the midst of a granular opaque matter, in which they show by transparency, and which has the appearance of the cellular plasma that surrounds these organs before their maturity; and, 2, the vessels, which form very distinct bundles in the axis of the cone, only present transverse striæ or scarcely distinct rings, and not the strongly marked streaks of adult scalariform vessels.

This want of maturity has perhaps been favourable to the integrity of these fossils; but it is possible, and even probable, that the microspores and macrospores, when their development is complete, would present some differences which must not be regarded as arising from a really distinct organization. Some of the spores composing the triple microspore already appear disposed to become isolated, and would probably acquire the trigonal form indicated by J. Hooker for the spores of *Lepidostrobus*. Some of the macrospores also seem to present in their interior a more complex organization, which would indicate a tendency towards the form with a trigonal apex of the macrospores of *Isoëtes*.

Fresh specimens, even mere fragments, but at a different degree of development, will perhaps hereafter complete our knowledge of this subject; but from this day forth the existence of these gigantic Lycopodiaceæ, showing a still more complete relationship to certain existing forms of this family, is established indubitably.

BIBLIOGRAPHICAL NOTICE.

Observationes circa Pezizas Fennicæ. Scripsit WILLIAM NYLANDER.
Accedunt tabulæ II. lithographicae.

THE above treatise has been called forth by the work of Karsten entitled 'Expositio Pezizarum sibi cognitarum Fennicæ,' concerning which Prof. Nylander observes that the characters given are, for the most part, mere transcripts of those of Fries in the 'Systema Mycologicum,' with the addition of some occasional and vague remarks on the fruit. The author considers M. Karsten to have neglected the means he had at his disposal of verifying the species he describes, in not consulting collections of published specimens, such as those of Mougeot, Desmazière, and Rabenhorst, and states that he has himself acquired a more accurate knowledge of the subject from studying the specimens contained in the Museum of the Society for the